

# **SD12-2 OWNERS MANUAL**

**AHB** ALLEN AND HEATH BRENNELL LTD  
AUDIO EQUIPMENT MANUFACTURERS

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The SD 12/2 stereo mixing console has been designed to give maximum flexibility in both sound reinforcement and recording situations. The unit will satisfy all normal requirements in terms of operational facilities and provision has been made for the addition of external control equipment.

Each channel features a circuit breaking line input enabling the operator to insert compressor/limiters or any other studio device without the additional expense of an external patch bay. Each input channel incorporates a direct post fade line output which enables the operator to feed an equalized signal to any external system. This feature is discussed in greater depth in the operational text.

The SD 12/2 has a comprehensive monitor system which allows quality and calibration checks to be made on all functions of the unit, without disturbing any of the programme outputs at the time.

Provision is also made for monitoring of external programme sources such as tape machines, broadcast programme cues, stage to desk communications etc. Equalisation is comprehensive with two level controls in the critical mid range spectrum. Separate foldback equalization is provided which is essential for positive control of acoustic feedback.

A full range of accessories are available for the SD 12/2 including a custom built heavy duty flight case and a customer tailored multi-way cable assembly.

The SD 12/2 has been constructed with simple 'in field' servicing in mind. Removal of the base panel exposes the entire circuitry and any channel module can be removed without interfering with the rest of the unit - invaluable in emergency situations.

## SD 12/2 INITIAL SETTING UP INSTRUCTIONS

Setting Up - These instructions must be followed in sequence if optimum performance is to be achieved.

1. Set all faders to minimum and input gains to zero (fully anticlockwise)
2. Connect main outputs to power amplifiers or multiway connector box if used. Connection details are given on page 6.
3. Connect sources such as microphones, tape machines or other line level devices to respective inputs. A line input jack will automatically break the mic' input (see page 5)
4. Connect external echo or reverberation unit to send and return sockets (see page 5)
5. Connect AC power cord to mains supply.
6. Push power switch to 'on' position. This should immediately illuminate the VU meters on the front panel. If meters do not light up then check power lead and main fuse (see service data). It is normal for the meter needles to kick over then settle back to the rest position.
7. Set monitor selector to p.f.l. Press p.f.l. button on channel one. With a microphone connected to the channel and the desired signal (e.g. speech) being fed into it, slowly turn up the channel input gain until the VU meters are reading 0VU. This setting will give the correct gain at the input stage of the mixer and hence minimise distortion and noise. It should be realised that a change of microphone or programme source will necessitate a change of input gain setting. At this stage the desired signal can be monitored using headphones. The monitor level control will affect the hearing volume but not the meter reading (see block diagram in catalogue)
8. Proceed to set correct gain on all microphone inputs that are being used. To obtain optimum settings each microphone channel should be checked individually. Line input signals should be adjusted at source to give the correct meter reading.
9. If a foldback (stage monitor) system is being used change the monitor selector to 'foldback'. Set the foldback send control to half gain (12 o'clock). Bring each channel foldback control up to the desired level being careful not to send the foldback system into 'ringing' (acoustic feedback). The normal foldback reading on the meters should not exceed 0VU as distortion may result. It should be noted that 0VU indicates a foldback output level of 0dBm. The maximum output level before clipping is +18dBm.
10. The foldback equalization should be adjusted for artist preference or minimum feedback - whichever is the most important. See section on foldback systems.

11. Set the monitor selector to 'Output'. Adjust each channel fader in turn to obtain a normal reading (OVU) on the monitor meters.
12. Bring the master faders up to obtain a desired operating level on the main sound system. It should be noted that the meters will always read the output level pre-master faders.(Except U.S. Model)
13. Adjust each channel for the desired equalization and sound balance. Excessive bass or treble boost may necessitate a reduction in channel fader setting in order to avoid feedback.
14. If an echo unit is connected, set echo return controls to half gain (12 o'clock). Adjust each channel echo level for the desired effect. The echo level setting will depend on the external equipment in use and experimentation will yield the optimum results in terms of noise and distortion.
15. Always switch power amplifiers off before disconnecting or switching off the mixer.

The above instructions are intended to enable the operator to adjust the console for normal working in the minimum of time with a minimum of difficulty. The following sections give an in depth description of the SD 12/2's operational potential.

## DETAILED OPERATIONAL INFORMATION

### INPUT TERMINATION

#### Mic' Inputs

The normal operating impedance of the microphone inputs is 1kohm. This provides correct loading for any low impedance microphone (25-250 ohms).

The variable gain electronically balanced inputs will accept a wide range of signal levels and provided the channel gain is set as instructed no problems will occur.

In accordance with current practice the mic inputs are phased with pin 3 positive and pin 2 negative with respect to pin 1 which is earthed. Jack plug terminations will be in phase with pin 3 of all XLR terminations. A simple microphone phase test is described in the section on sound system hints.

Unbalanced low impedance microphones should be wired with pin 3 hot (+) and pins 1 and 2 strapped together to earth. High impedance microphones should be connected to a matching transformer which will enable much longer lengths of cable to be used between the transformer and the mixer. High impedance microphones are rapidly losing favour with musicians and are now considered a 'left over' from the days of valve mixers.

#### Line Inputs

The channel line inputs are designed to operate as channel break points and this feature is described in detail under 'Special Applications'. For normal line level input operation, a single pole  $\frac{1}{4}$ " jack plug should be inserted and this will automatically break the microphone signal (if in use). It should be noted that the microphone input will still load the microphone itself, and therefore any other equipment bridging the microphone will not be affected by the jack plug insertion.

The line input has a high bridging impedance and is therefore ideal for applications such as multi-track tape remixing or any situation where the programme source is feeding other devices in addition to the SD 12/2. The line input signal level should be adjusted to give the correct p.f.l. meter reading as described in the 'setting up' instructions. A maximum level of +15dBm is permissible at this input. The line input hot (+) tip is in phase with pin 3 on all XLR terminations and phase checks should be carried out in such situations as direct injection of bass guitar.

#### Echo Return

A two pole stereo jack socket returns the echo signal on to the main mixer output busses. The input impedance is 10kohms providing adequate loading of all common echo and reverberation devices.

## OUTPUT TERMINATIONS

### Main Outputs (Programme)

The stereo output of the console is terminated on XLR connectors which are unbalanced as supplied. Pin 3 is positive with respect to earth (pin 1). Pin 2 is earthed to pin 1. It should be noted that some power amplifiers have their positive (hot) input terminated on pin 2 of an XLR socket. If this is so then three options are open, although only one will produce a standardized solution.

- a. Use a cable which is phase reversed i.e. pin 2 to pin 3, pin 3 to pin 2, pin 1 to pin 1 (non standard)
- b. Reverse the connections to pins 2 and 3 on the mixer outputs (non-standard)
- c. Reverse the connections to pin 2 and 3 inside the power amplifier (a standard solution)

The effect of using such a power amplifier without modification will simply be to short circuit the output of the SD 12/2. This will do no permanent damage but obviously no output signal will be obtainable. Balanced output operation for long multiway cables is possible using external balancing transformers. The output impedance is very low enabling virtually any load (including 600 ohm lines) to be used. It would also be possible to drive several loads simultaneously without affecting output level capability.

### Direct Channel Outputs

These output provide direct access to the equalized signal on any channel and possible uses of this facility are described under 'Special Applications' and 'Recording Techniques'. The termination is a standard single pole jack socket providing an unbalanced line signal at 0dBm nominal operating level.

### Fold Back

The foldback or cue mix is terminated on a single pole unbalanced socket accepting standard  $\frac{1}{4}$ " jack plugs. The output is designed for normal 0dBm operation and will drive most conventional power amplifiers to full power. The output impedance is less than 100 ohms enabling full output to be achieved into a 600 ohm (or greater) load.

### Echo Send

This termination may be considered identical to the foldback output.

## ADDITIONAL TERMINATIONS

### Headphones

A stereo  $\frac{1}{4}$ " jack socket is provided on the front panel of the console. A 500mW per channel amplifier will drive all Hi Fi type stereo headphones of low impedance (8 ohm variety). High impedance mono headphones can be driven by any of the line level outputs on the rear panel of the console. A four way monitor selector is provided enabling the operator to listen to all major console functions without disturbing the main outputs.

### Tape Monitor

A stereo jack socket is provided on the rear panel of the console enabling the output of any stereo device to be monitored through the headphones. This bridging line level input will be discussed under 'Special Applications' and 'Recording Techniques'

## POWER SUPPLY

A three pin detachable mains cable feeds an integral dual voltage power supply which is fully regulated. The mixer can be operated on either 220V-250V 50Hz or 120V 60Hz supply, an internal transformer tapping effecting the change.

It is essential that the correct fuse is fitted for the supply in use:

500 mA	for	240V Supply
1 A	for	120V Supply

The regulated power supply permits local variations in supply voltage without degradation of the mixer performance.

## OPTIMUM OPERATION OF CHANNEL FACILITIES

### Channel Gain

This control permits accurate matching of microphone signals to the electronic performance of the console. It is possible for a typical dynamic microphone to deliver signal levels of anything between a few microvolts and in excess of one volt. It is unlikely that both levels will be encountered on one microphone in any situation and therefore it is possible to tune the mixer input sensitivity for optimum operation. The pre-fade listening mode enables the operator to set each channel individually as described in the 'setting up' section.

### Equalization

A four band equalization section is incorporated in every channel. This allows a degree of tonal variation which would have been unheard of a few years ago. In sound reinforcement applications the critical midrange spectrum can be tailored for maximum intelligibility in the case of speech or for optimum tonal balance in the case of music material.



Feedback control can also be achieved by selective cutting in the offending frequency band. It should be noted that further equalization can be achieved by the insertion of a equalizer into the breaking line/output as described under 'Special Applications'.

### Foldback

A particular feature of the foldback circuit of the SD 12/2 is that it is independant of the channel equalization and faders. This ensures that once the foldback gain has been adjusted a change in channel levels or tone controls will not send the foldback system into feedback. This feature is also important when a completely independent 'clean feed' is required for monitoring or recording purposes.

### Echo

The channel echo sends are post fade and eq. which ensures that a microphone does not remain live on the main sound system after it has been faded down. The stereo return enables echo to be panned for special effects.

Optimum echo send and return levels will be found by experiment but as a guideline, the inherent noise level of an echo unit should just be audible when the echo return controls are correctly adjusted for normal operation. It should be noted that if the echo level is increased on a channel then the overall level of that channel will increase. In a feedback prone situation great care must be exercised when using echo for special effects.

### Monitoring

The operator has the facility to monitor the functions of the console in stereo including the return signal of a tape recorder. The headphone monitor control increases the audible monitoring level but does not effect the visual reading on the meters. The meters will monitor the selected signal and can be used as described for the accurate setting up of each console function. It should be noted that the main output faders do not affect the meter reading. It is possible to change this to post fade as described in the 'Servicing Instructions'.

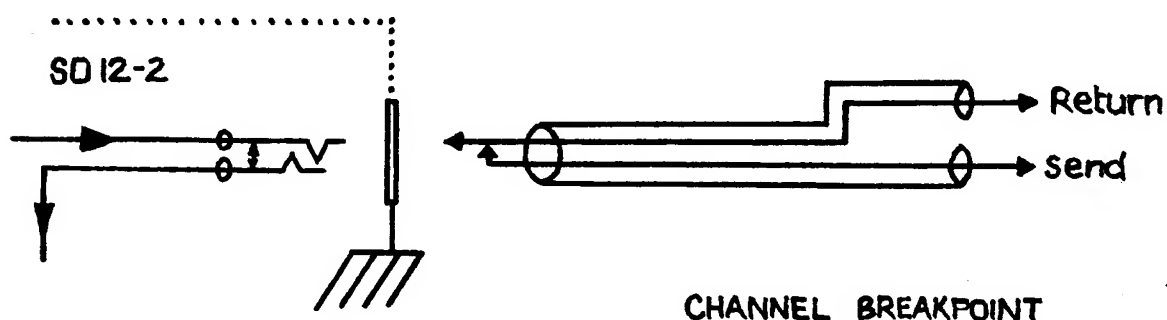
## SPECIAL APPLICATIONS

### Additional Inputs

There are several ways in which the mixing capabilities of the SD 12/2 console can be expanded. It is possible to link two consoles via the echo return circuit of one unit. This will give a 24 into 2 format which can be expanded even further. The use of one channel as an echo return would restore echo facilities to the 'master' console.

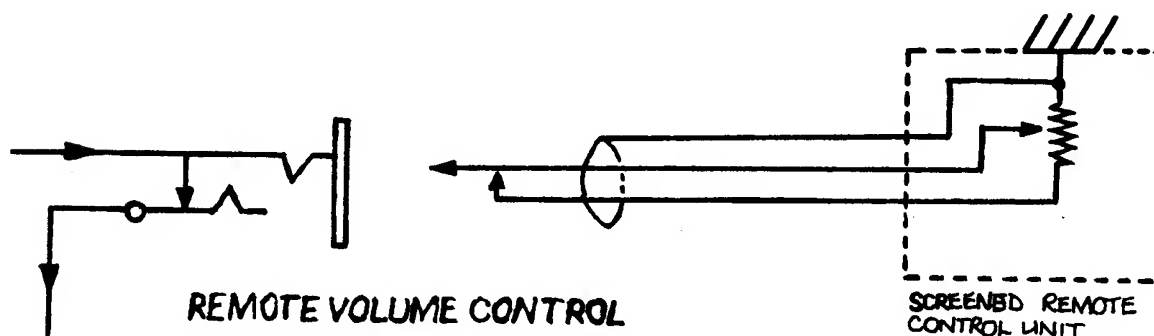
### Channel Breakpoint

As mentioned earlier it is possible to insert any line level device into a channel for the purposes of special effects. A typical situation would be the use of a limiter for the control of a vocalist who is overloading a P.A. system or tape recorder. The external unit should be connected via a stereo jack plug wired with sleeve (ring) as the send and the plug tip as return.



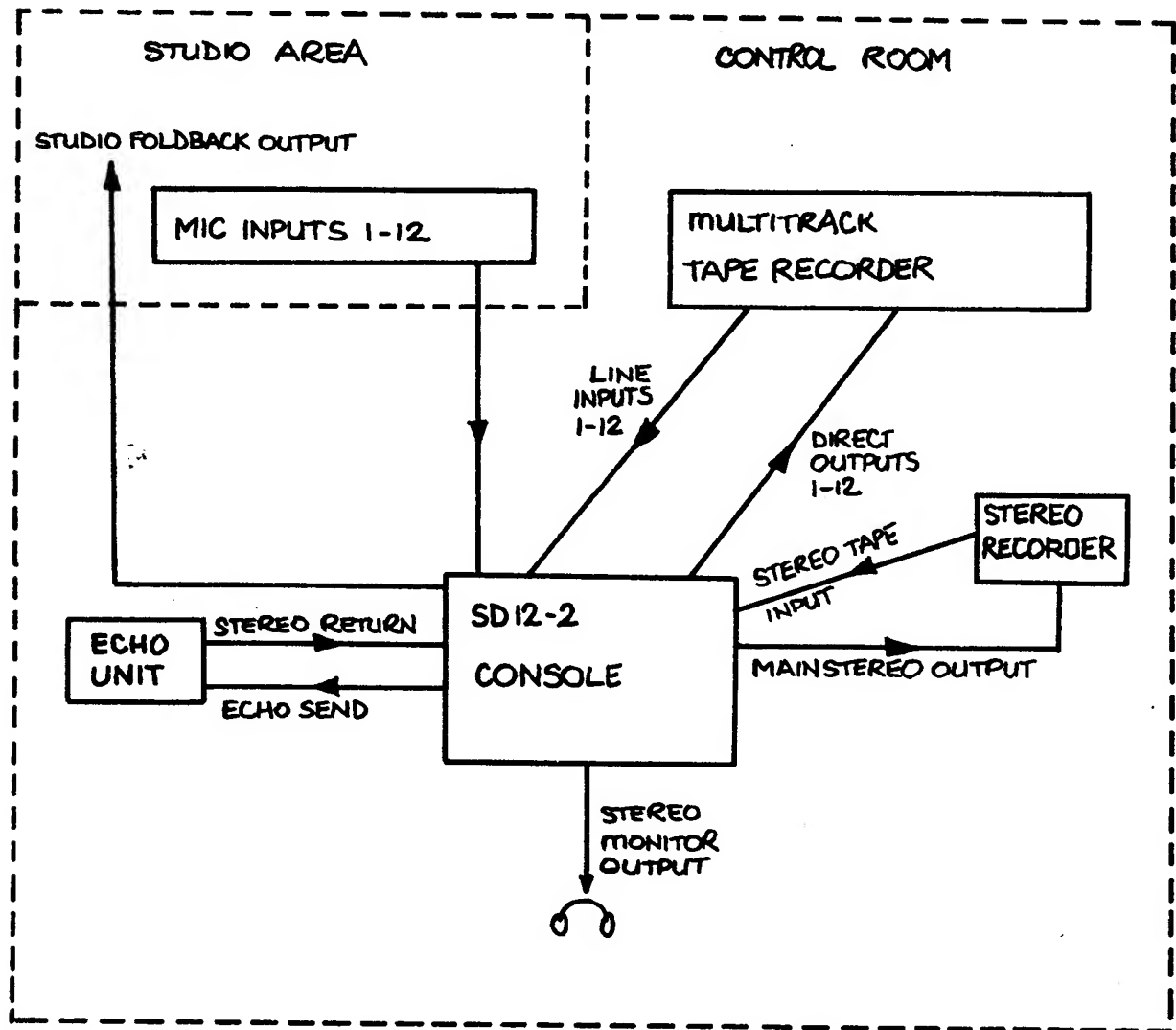
### Remote Volume Control

The channel break point can be used for the external control of the volume on that channel - an essential feature for groups or entertainers who do not have a full time sound engineer. A twin core screened cable of up to 50 ft. length may be used in conjunction with a potentiometer of between 3k0hm and 5k0hm.



### Direct Outputs

Any channel may be sent directly to external equipment without affecting its addition to the main stereo mix. This facility can be used for the remote control of stage equipment such as bass guitar amps when total control of the stage sound is required. This output may also be used for individual foldback sends and for specialist cuing systems in theatres etc. Its uses in recording are discussed in the next section.



## RECORDING TECHNIQUES

The SD 12/2 console was designed as a multi-purpose control unit and as such is eminently suitable for both 'live' and studio recording.

The direct channel outputs may be used during a live performance to feed an 8 or 16 track tape recorder without any additional mixing equipment. The outputs of a multitrack machine may be fed into the line inputs of the SD 12/2 in order to mix down on to a stereo master tape.

Overdubbing may be achieved simply by unplugging the line return on a channel and feeding the microphone signal on that channel into the tape machine. The tape machine must have full sync facilities as on the Brenell 8 track machine.

When in a stereo mix down mode it is possible to monitor 'off tape' using the tape return circuit on the SD 12/2 monitor system.

## SOUND SYSTEM HINTS

### Cable Layout

The use of high quality screened and balanced microphone cable will eliminate virtually all interference problems associated with sound reinforcement systems. If your SD 12/2 mixer is used in conjunction with a multicore system such as the SD 12M then it is essential to maintain a common earth. If the console is connected to a power socket at some distance from the stage it could possibly be connected to a power point of different earth potential to the stage power points. This will result in a current flow along the earth path from stage to console (via the multicore) and therefore a noticeable hum will be heard through the speakers. Earth loops as they are called may be cured by running the console power from the same power source as the stage equipment. When a permanent earth path to the stage exists it may be necessary to remove the mains earth connection to the console. This should only be done by qualified personnel who have established an alternative earth path.

### Phase Check

Set all microphones connected to the mixer for equal level. Hold two microphones together and talk into them. If the operating level falls dramatically then one microphone signal is cancelling the other ie. an out of phase condition exists.

Using one microphone as a reference all other microphones and cables may be checked for correct phasing.

## SERVICE INSTRUCTIONS

### Guarantee

The SD 12/2 console is covered by a parts and labour guarantee for a period of one year from the date of initial purchase. The unit should be returned to our factory or to an authorised service agency. Postage should be prepaid. Return postage or shipping costs may be deferred at the sole discretion of the company.

### Service Agencies

Allen and Heath Limited,  
231-235 Liverpool Road,  
London, N1 1LY

Audiotechniques Inc.,  
142 Hamilton Avenue,  
Stamford, Connecticut,  
06902, U.S.A.

### Fuses

The Main Fuse is located in a screw-in capsule on the rear panel of the unit. The replacement value is:

20 mm x 5 mm	Quick blow	:	240V	0.5A
			120V	1.0A

D C Fuse. This fuse protects the components within the console and will not blow under normal circumstances. The rating is 20 mm x 5 mm at 1A. The fuse is located on the power supply board.

### Voltage Setting

Disconnect mixer before removing panel. Remove base panel - see service access.

The SD 12/2 is supplied for 220-250 volt working except for models shipped to the U.S. and Canada which are set for 110-120 volt working. The voltage setting may be changed from 240V to 120V by altering the primary tapplings on the mains transformer from series to parallel.

Connect the violet wire to the blue and then the grey wire to the brown. The connections should be made at the double on/off switch. Reference should be made to the main circuit diagram.

Note: The correct fuse value must be used (see Fuses)

### Service Access

N.B. Disconnect mains before removing panel.

a. Remove four threaded (M3) top panel screws.

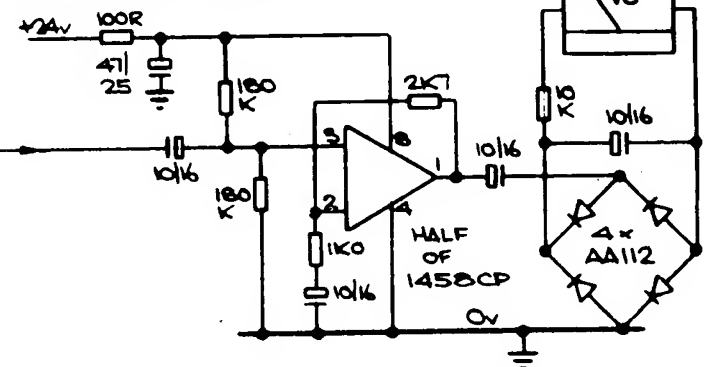
b. Turn unit upside down and place on soft surface. Remove eight self tapping screws from the base plate.

Plate may now be removed and placed to one side.

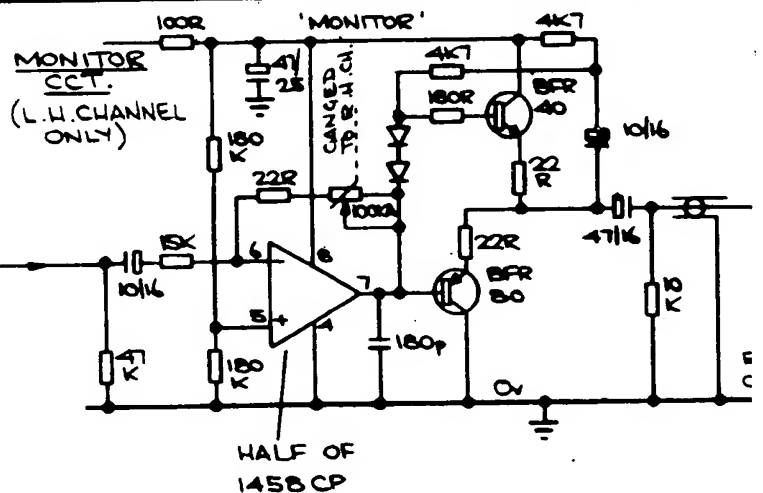
## TONE AMPLIFIERS



METERING CCT.  
(L.H. CHANNEL ONLY)

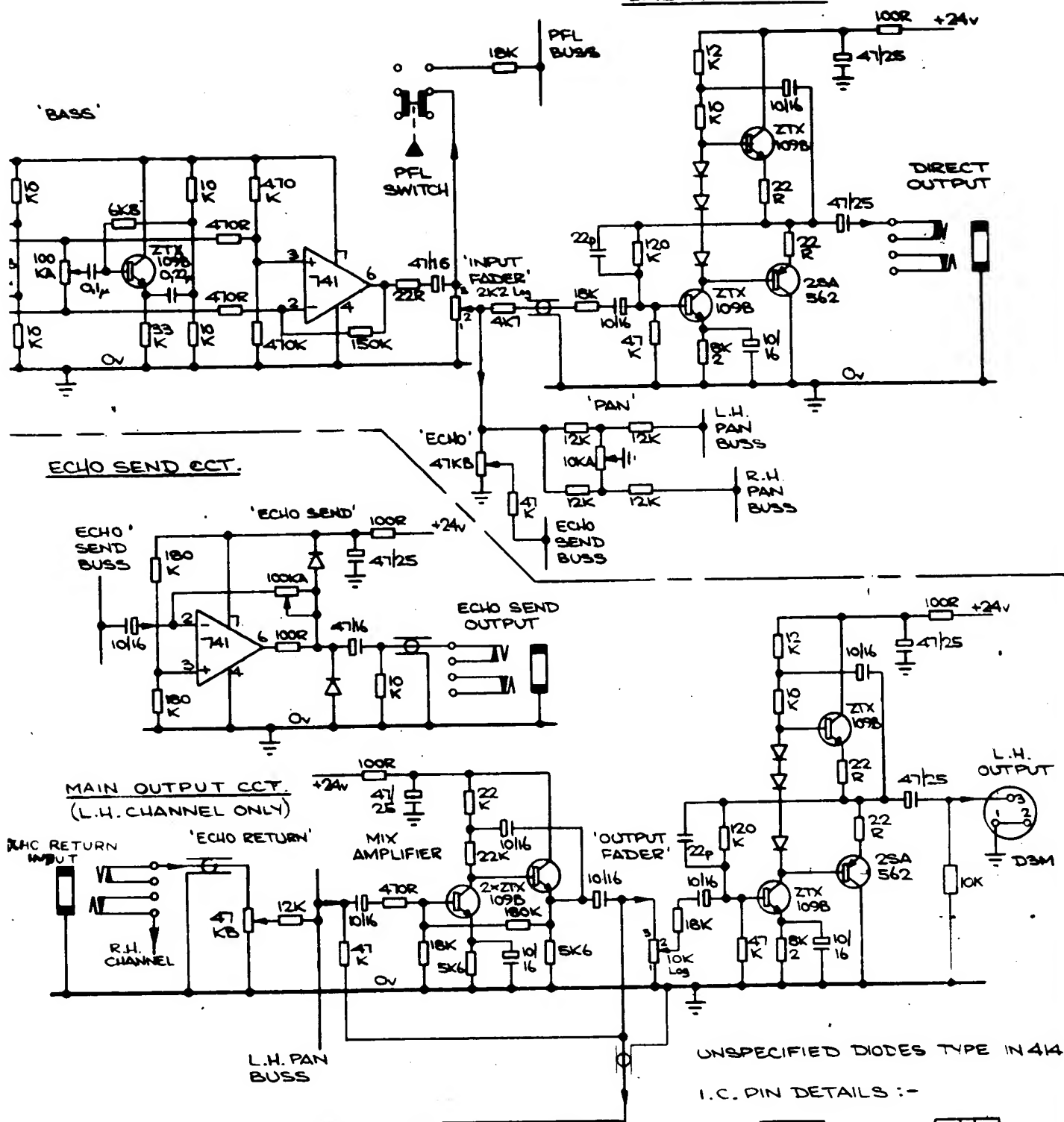


MONITOR  
CCT.  
(L.H.CHANN  
ONLY)

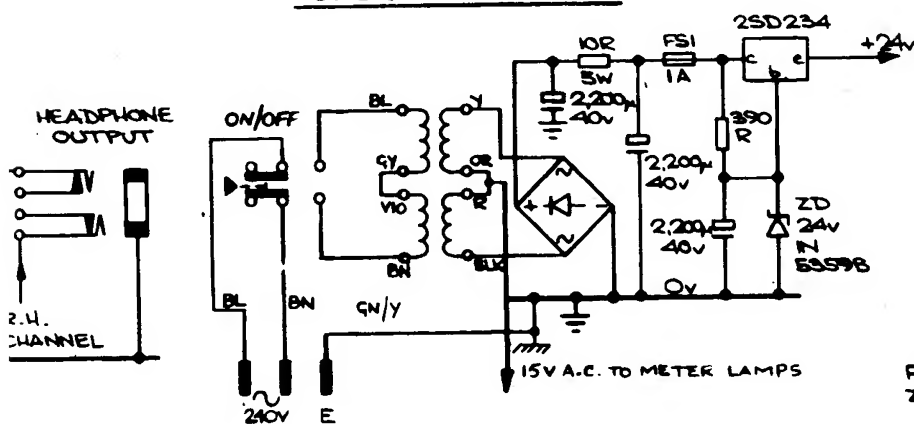


ALLEN & HEATH LTD.  
SD12 x 2 MIXER CIRCUIT DIAGRAM

## LINE AMPLIFIER

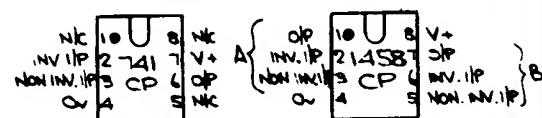


POWER SUPPLY CCT.

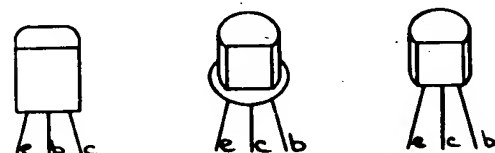


UNSPECIFIED DIODES TYPE IN 4148

### I.C. PIN DETAILS :-



NATIONAL MOTOROLA  
TRANSISTOR DETAILS:-



FERRANTI TOSHIBA  
ZTX 109B(NPN) 2SC 732(NPN) BFR 40(NPN)  
2SA 562(PNP) BFR 80(PNP)



### Meter Bulb Replacement

Bulb is push fit in holder. Holder is push fit in meter housing. Replacement bulbs are available from our service department.

### Meter Replacement

Remove two screws either side of meter housing. Release foldback output socket retaining nut. Withdraw socket. Unsolder terminations to meter. Withdraw meter supporting bracket complete with mains switch. Do not strain any wires running from the mains transformer. Meter may now be replaced and refitted in reverse order.

### Channel Removal

Remove knobs from desired channel potentiometers. Remove pot retaining nuts. Unsolder wires to channel fader and mic input connector. Remove retaining nuts on direct output and line input. Unsolder and remove bussbars. Channel printed circuit board may now be removed for service. P.c.b. should only be removed for replacement of potentiometers, p.f.l. switch or jack sockets. All other components may be tested and replaced without removal. The mains transformer is held by one central screw and may be removed without difficulty. The rail voltage of the mixer is +24V. For all reference DC and AC test levels refer to circuit diagram.